U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUBCOMMITTEE ON RESEARCH

HEARING CHARTER

The Role of Social Science Research in Disaster Preparedness and Response

Thursday, November 10, 2005
10:00 a.m. - Noon
2318 Rayburn House Office Building

1. Purpose

On Thursday, November 10, 2005, the Research Subcommittee of the Committee on Science of
the U.S. House of Representatives will hold a hearing to better understand how the social
sciences can inform planning for, response to, and recovery from natural hazards and disasters.

2. Witnesses

Dr. Susan Cutter is a Professor of Geography at the University of South Carolina, and the
Director of the Hazard Research Laboratory.

Dr. Roxane Silver is a Professor in the Department of Psychology and Social Behavior in the
Department of Medicine at the University of California, Irvine.

Dr. H. Dan O'Hair is a Professor and the Chair of the Department of Communication at the
University of Oklahoma. He is also the current Vice President of the National Communications
Association.

Dr. Shirley Laska is a Professor of Environmental Sociology and Director of the Center for
Hazards Assessment, Response and Technology at the University of New Orleans.

3. Overarching Questions

- How do individuals perceive risk and respond to warnings and other crisis communications?
  What role does the media play in risk communication and the formation of public views and
  behavior?

- How do individuals respond to traumatic experiences, such as terrorist attacks or natural
  disasters? How can insights into fundamental questions of cooperation, social order and
  resilience improve preparation for and response to new threats and disasters?

- How is local or regional vulnerability to natural hazards and disasters assessed? How does
  the natural and built environment affect the perception of risk and subsequent behavior?

- What are the priority social science research areas related to disaster preparedness and response? How are the results of such research being translated into practice?

4. Brief Overview

- The U.S. is exposed to a wide range of natural hazards, such as hurricanes, floods and earthquakes, as well as the continuing threat of terrorism and other technological disasters. While new tools and technologies have improved the prediction of many natural hazards, complete preparedness and response also requires an understanding of human behavior, particularly in emergency situations. This is the domain of the social sciences.

- The National Science Foundation (NSF) accounts for nearly half ($106 million in fiscal year 2004) of the overall federal investment in basic social sciences research at colleges and universities. In the areas of disaster preparedness and response, NSF supports short-term research projects immediately after disasters to gather and analyze information about public attitudes and behavior. NSF also supports longer-term studies on individual and group perception of risk, the vulnerability of different regions and populations to particular dangers, and individual and group resiliency in the aftermath of a natural or other disaster.

- While there is a body of social science knowledge on disasters, particularly in the context of natural hazards, the lack of connections between researchers and emergency planners and responders has led to uneven or incomplete application of lessons learned to improve current disaster preparedness.

5. Background

Because of its natural, climatic and geographic diversity, the U.S. is exposed to a wide range of natural hazards, such as hurricanes, floods and earthquakes, as well as the continuing threat of terrorism and other technological disasters. These risks, combined with increased population densities and the development of flood plains, coasts, and other vulnerable areas, have raised the disaster risk for the U.S. to an all time high.

The federal government has been investing in science and technology to combat terrorism and manage natural hazards. As a result, new tools have been developed to improve the detection and remediation of biological, chemical, radiological and nuclear treat agents, and new technologies, such as satellites and Doppler radar systems, have improved the prediction of hurricane, tornado and other storm paths. These tools are an important part of managing a disaster, but a complete response also requires an understanding of human behavior, particularly in emergency situations.

Disaster Research at the NSF Directorate for Social, Behavioral and Economic Sciences

Most social science research at NSF is funded through the Social, Behavioral and Economic Sciences (SBE) Directorate. For more than thirty years, NSF has supported disaster research that immediately dispatches scientists and engineers in the wake of crises ranging from hurricanes to terrorist attacks. NSF has a variety of mechanisms available to support this type of research, including the Small Grants for Exploratory Research (SGER, pronounced "sugar").

These SGER grants are offered across the foundation and they are awarded quickly to allow scientists to gather data that is likely to disappear over time.

Within SBE, SGER grants are used to focus on such issues as organizational preparedness for and response to social crises, risk assessment and vulnerability analysis, and resilience. In the aftermath of Hurricane Katrina, for instance, SBE awarded 35 SGER grants to study decision making and political mobilization before, during, and after the hurricane, the economic and psychological dimensions of recovery on children and adults, and the breakdown of law and order following Katrina and its effects on recovery efforts and on victims. Similarly, after the terrorist attacks of 2001, SBE SGER grants funded research on issues predicting affective reactions to collective loss, understanding individual response to a salient and pervasive health threat such as anthrax, and resiliency and coping in the wake of the attacks and ongoing threats.

SBE also funds longer-term research that is relevant to natural hazards and disasters. SBE research on how human emotion drives decisions can help emergency planners understand how personal choices can turn a crisis into a disaster. For instance, one NSF study found that most people living in areas prone to floods, earthquakes, and other devastating natural disasters take no steps to protect themselves or their property – important information for federal, state and local emergency managers. In addition, according to NSF-supported research, there are several myths about public response to crisis warnings, including the belief that people are confused if given too much information, that "crying wolf" leads to inaction, and that people automatically follow instructions. Other research into risk perception has highlighted how the genders react differently—white males perceive risks as much smaller and much more acceptable than other groups do, while women are more likely than men to seek out information from the media and then take responsibility for adapting in a crisis.

Other SBE supported research is helping gain insights into the origins of terrorism and the after effects of an attack. For instance, the intelligence community and NSF are sponsoring research on the detection of deception that includes investigation and development of behavioral biometrics, content analysis of foreign documents and speech, alternatives to the polygraph, and improvements in intelligence analysis by increasing understanding of thought processes, learning and decision making in individuals and teams. In addition, and in an attempt to better understand the beliefs of people in Islamic societies, SBE recently supported an analysis of attitudes and values of the Islamic public in Egypt, Iran and Morocco. Researchers concluded that there is considerable and unexpected variation in values. Despite living under a religious regime for more than two decades, Iranians appear to be less religious and more nationalistic than either Egyptians or Jordanians, who live under secular regimes. They also found that Iranians have more liberal attitudes toward marriage and women working outside the home than the respondents from the other two countries.

National Science and Technology Council Reports on Research Related to Disasters and Counterterrorism

Interagency coordination of research related to disaster preparedness and response and to combating terrorism occurs through meetings and reports of the National Science and Technology Council (NSTC), a cabinet-level council tasked with coordinating federal policies for science and technology. In July 2003, the NSTC's Subcommittee on Disaster Reduction

issued a report on *Reducing Disaster Vulnerability Through Science and Technology* which identified six areas critical for meeting the challenges of future hazard risk reduction for the nation.[1] They are:

1. Leverage existing knowledge of natural and technological hazards to address terrorism events;
2. Improve hazard information data collection and prediction capability;
3. Ensure the development and widespread use of improved hazard and risk assessment models and their incorporation into decision support tools and systems;
4. Speed the transition from hazard research to hazard management application;
5. Increase mitigation activities and incentives; and
6. Expand risk communication capabilities, especially public warning systems and techniques.

Social science research plays a critical role in the each of these areas, from development of vulnerability assessment techniques (area 2) to determination of effective incentives for risk mitigation (area 5) and evaluation of effective risk communication (area 6).

In February 2005, NSTC's Subcommittee on Social, Behavioral and Economic Sciences released a report entitled *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences*.[2] The report found that the social sciences have much to contribute to the development of strategies that enhance the Nation's capacity to predict, prevent, prepare for and recover from a terrorist attack. The immediate priorities for social science research include:

- collection of data, such as the outcomes of threat scenario exercises and health surveillance data, that can be used to inform and model preparation strategies;
- application of modeling methods to complex problems such as understanding the intersections of terrorists and victims and the vulnerabilities of terrorist networks;
- application of decision science research to risk communication strategies, including assessing people's risk perception and educating those who deliver risk and vulnerability messages about how to increase their effectiveness; and
- application of risk, threat and vulnerability assessment and vulnerability models in the creation and evaluation of response plans.

NSF Directorate for Social, Behavioral and Economic Sciences

NSF Directorate for Social, Behavioral and Economic Sciences (SBE) supports basic research, education and infrastructure in the behavioral, cognitive, social and economic sciences, referred to collectively as the social sciences. The Fiscal Year 2006 (FY06) budget seeks $198.79 million for SBE, nearly $2 million over the FY05 level, or about 4.2 percent of overall funding for NSF research. SBE accounts for nearly half of all federal support for basic research in the

---

[1] NSTC's report *Reducing Disaster Vulnerability Through Science and Technology* can be found on line at http://www.ostp.gov/NSTC/html/SDR_Report_ReducingDisasterVulnerability2003.pdf.
[2] NSTC's report *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences* can be found on line at http://www.ostp.gov/nstc/html/terror.pdf.

social sciences at colleges and universities, and, in some fields, such as anthropology, SBE is the predominant or exclusive source of federal support.

Table 1. SBE Funding v. Total NSF Research Funding (Dollars in Millions)

	FY04	FY05 Current Plan	FY06 Request
Total NSF Research	$4,293.34	$4, 220.55	$4,333.49
SBE	$184.30	$196.90	$198.79

SBE comprises two research divisions: Social and Economic Sciences (SES) and Behavioral and Cognitive Sciences (BCS). Research in economics, sociology, political science, decision-making and risk analysis, supported by SES, has yielded theories and information that have helped inform and improve public policy, business management, and economic and regulatory action. Research into the psychological, cognitive anthropological and geographic sciences, supported by BCS, has improved understanding of human cognition, action and development, helping scientists answer fundamental questions, including how the human brain learns. SBE also supports the collection and dissemination of statistics related to the science and engineering enterprise through the Science Resources Statistics Division.

Other NSF Disaster Research

Outside of SBE, most of NSF's long-term research into natural hazards, disasters and their mitigation takes place within the Geosciences and Engineering Directorates. Specifically, the Engineering Directorate funds research on the impact of natural and technological hazards on buildings and the environment, including studies of the mechanisms of structural failures. The Geosciences Directorate supports research into the mechanisms that cause tornadoes, windstorms, and hurricanes through the collection and analysis of meteorological data, including wind speeds and storm surge. Like SBE, the Engineering and the Geosciences Directorates use SGER grants to fund research in the immediate aftermath of disasters.

NSF also funds research into Human and Social Dynamics, an NSF-wide priority area which supports research on human actions and development as well as on organizational, cultural, and societal adaptation. Although responsibility for Human and Social Dynamics priority area, and the bulk of the $40 million in funding, comes from SBE, other NSF Directorates contribute support and expertise to the research on how humans and societies understand and cope with change, including natural hazards and disasters.

Other Federal Support for the Social Sciences

Outside of NSF, the National Institutes of Health (NIH) and the Department of Defense (DOD) provide the bulk of federal funding for social science research. At NIH, behavioral and social science research is integrated into most NIH institutes and centers, with the largest amounts of funding being used to study the impact of behavior and society on diseases and illnesses such as drug abuse, mental health, cancer, and alcohol abuse. Now that budget increases are more

modest, most of this research is associated with a specific disease and more projects are becoming clinical or applied in nature. The National Institute for Mental Health (NIMH) has developed a research program to assess the mental health impact of the World Trade Center and Pentagon attacks, it has convened a major national workshop on mental health needs in disaster response and it is currently exploring additional behavioral/mental health research aimed at the treatment of trauma in individuals and communication during public health crises and other traumatic events.

At DOD, the social and behavioral sciences fund research in the broad categories of personnel training, leadership development, war-fighter sustainment and physical performance, and systems interfaces and cognitive processing. This research is typically more applied and more specific to DOD's mission. Similarly, federal support for social science research closely tied to their missions also comes from the Departments of Agriculture and Justice.

A new source of funding for basic social science research related to natural hazards and disasters is emerging at the Department of Homeland Security (DHS). In January 2005, DHS established a Center of Excellence for Behavioral and Social Research on Terrorism and Counter-Terrorism at the University of Maryland. The $12 million, three-year grant supports basic research in the social sciences, including studies on the sources of, and responses to, terrorism, the psychological impact of terrorism on society, and how to increase the American public's preparedness, response, and resilience in the face of threat. In addition, in 2003, DHS established the Center for Risk and Economic Analysis of Terrorism Events at the University of Southern California to support the development and application of tools for assessing the risks and consequences of terrorism. Also, the DHS Scholars and Fellows Program supports the development and mentoring of the next generation of scientists, including social scientists, as they study ways to prevent terrorist attacks within the U.S., reduce America's vulnerability to terrorism, and minimize the damage and recovery efforts from attacks that do occur.

6. Witness Expertise and Questions:

Susan Cutter is a Carolina Distinguished Professor of Geography at the University of South Carolina. She is also the Director of the Hazards Research Lab, a research and training center that integrates geographical information science with hazards analysis and management. Dr. Cutter's primary research interests are in the area of vulnerability science—what makes people and the places where they live vulnerable to extreme events and how this is measured, monitored, and assessed. In response to the 9/11 terrorist attack, Dr. Cutter led a team of researchers who examined the use of geographical information science techniques (e.g. geographical information systems, remote sensing) in the World Trade Center rescue and relief efforts. Dr. Cutter has also led post-event field studies of evacuation behavior from the 2005 Graniteville, SC train derailment and chlorine spill, and the geographic extent of the storm surge inundation along the Mississippi and Alabama coastline after Hurricane Katrina.

Dr. Cutter has been asked to address the following questions in her testimony:
- How do you assess local or regional vulnerability to environmental hazards? How can differences in vulnerability and losses be anticipated and embodied in mitigation and response to lessen the impact on individuals and places? And what are the limitations of

risk modeling in emergency management or response or in determining overall vulnerability?
- How does the natural and built environment impact the perception of risk and subsequent behavior?
- What role do technologies, such as geographic information systems and remote sensing, contribute to forecasting and managing a disaster? How can lessons learned mitigate the consequences of natural hazards and disasters?
- What are the top remaining research questions in this area?

Roxane Cohen Silver is a Professor in the Department of Psychology and Social Behavior at the Department of Medicine at the University of California, Irvine. Dr. Silver is an expert in acute and long-term psychological reactions to stressful events, ranging from the loss of a child to war and natural disasters, and she has researched and written extensively on the predictors of effective coping and the general theme of individual and community resiliency. Dr. Silver recently completed a three-year national longitudinal study of responses to the September 11, 2001 terrorist attacks. In 2003, Dr. Silver was appointed to the Department of Homeland Security's Academe and Policy Research Senior Advisory Committee. More recently, she was appointed to the Department of Homeland Security's Homeland Security Advisory Council's Weapons of Mass Effect Prevention Task Force.

Dr. Silver has been asked to address the following questions in her testimony:
- How do individuals respond to traumatic experiences, such as terrorist attacks or natural disasters? Are there common misperceptions about the coping process and its outcome? Is misinformation about response to a traumatic experience a problem in terms of managing a natural hazard or disaster?
- What explains the variability in response to a traumatic experience by individuals and by communities?
- What lessons have we learned about individual and community resiliency following a trauma? And how are these lessons being used to design effective interventions for response and recovery?
- What are the top remaining research questions in this area?

H. Dan O'Hair is Professor in the Department of Communication at the University of Oklahoma. His teaching and research interests include organizational communication, health systems, risk communication, and terrorism. Dr. O'Hair has published over 70 research articles and scholarly book chapters in communication, health, management, and psychology journals and volumes, and has authored and edited 12 books in the areas of communication, business, and health. In 2006, Dr. O'Hair will serve as president of the National Communication Association, the world's largest professional association devoted to the scholarly study of communication.

Dr. O'Hair has been asked to address the following questions in his testimony:
- How do individuals respond to warnings and other risk communications? How important is the perception of risk - rather than a quantitative estimate of it - in determining individual or societal response to a natural hazard or disaster? And how do responses vary, based on individual cultural, economic and experiential differences?
- How is risk communicated in an uncertain environment? What role does the media play in risk communication and the formation of public views and behavior?

- What lessons have we learned from effective - and ineffective - risk communications about natural hazards or disasters? How are these lessons being used to improve future risk communications?
- What are the top remaining research questions in this area?

Shirley Laska is a Professor of Environmental Sociology at the University of New Orleans and the Director of the Center for Hazards Assessment, Response and Technology. Dr. Laska's work has drawn attention to the need for more sub-regional analysis of hurricane evacuation behavior; more consideration to flood-proofing structures for less than 100-year floods to complement more stringent protection; more attention to considering local area drainage solutions to repetitive flood loss rather than demolition of individual repeatedly flooded structures; inclusion of the human/social impacts of coastal restoration rather than only the ecological; and also improving hazard mitigation outcomes by including community members and stakeholders as full participants in efforts to reduce the human risk to hazards. In November 2004, she published an article in *Natural Hazards Observer* entitled "What if Hurricane Ivan Had Not Missed New Orleans?"

Dr. Laska has been asked to address the following questions in her testimony:
- How do you assess local or regional vulnerability to environmental hazards? How can differences in vulnerability and losses be anticipated and embodied in mitigation and response to lessen the impact on individuals and places?
- What are the top remaining research questions in this area?
- How is social science research on disaster preparedness and response being translated into practice? What are the barriers to the implementation of research findings and how can these barriers be overcome or removed?